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Infrared Absorption Study of Potassium-Boro-Vanadate-Iron Glasses

Dinesh K. KANCHAN, Harshvadan R. PANCHAL
Department of Physics, Faculty of Science,
M.S. University of Baroda, Baroda-390 002, INDIA

Abstract: The IR studies have been made in the K_2O-B_2O_3-V_2O_5-Fe_2O_3 glass system. The increase in intensity and shifting of vibrational bands towards lower wave number at 1400-1350 cm^{-1}, 1200 cm^{-1} and 100-940 cm^{-1} in IR spectra have been ascribed to the formation of BO_3 to BO_4 and VO_5 to VO_4 tetrahedra along with the formation of non-bridging oxygens attached to boron and vanadium. In heat-treated glass samples, many new vibrational bands have been observed which were however, absent in the untreated samples. The preservation of the 1020 cm^{-1} band assigned to V=O bond suggests that K_2O shows the preference for borate network upto 20 mole % and is responsible for bringing the changes in borate and vanadate networks. At higher amount of K_2O, the presence of both BO_4 and VO_4 groups facilitates the formation of homogeneous solid solution of the present glass system.

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Authors

phys@tubitak.gov.tr

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